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Kumio Nago

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EXAMINER

NGUYEN, JOSEPH H

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/562,791	Applicant(s) NAGO ET AL.	
	Examiner JOSEPH NGUYEN	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/29/05.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 and 25-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/29/07, 12/29/05, 7/17/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 7 is objected to because of the following informalities: in claim 7, line 2, the phrase "all surface thereof is covered" should be corrected to read, "all surfaces thereof are covered". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1 and 28, it is not understood what it is applicant regards as "the phosphor layer includes a phosphor semiconductor with a wide band gap" because whether this phosphor semiconductor" refers to a single phosphor semiconductor with a wide band gap or to a phosphor and a semiconductor with a wide band gap is not clearly defined. For the sake of examination and in light of the specification, it is assumed that this phosphor semiconductor refers to a phosphor and a semiconductor with a wide band gap. Further, with respect to claim 28, it is not clear what applicant regards as "a plurality of y electrodes extending in parallel with a second direction orthogonal to the first direction in parallel with the face of the electroluminescent array"

because how can the y electrodes be orthogonal to the first direction and in parallel with the face of the electroluminescent array when the first direction is also in parallel with the face of the electroluminescent array?.

Regarding claim 2, it is not understood what it is applicant regards as “the phosphor layer has a laminated structure of a phosphor layer and a semiconductor layer with wide band gap because whether this phosphor layer and this semiconductor layer refer to a new phosphor layer and a new semiconductor layer or to the phosphor semiconductor with a wide band gap recited in claim 1 is not clearly defined.

Regarding claims 5 and 11, it is not understood what it is applicant regards as “the semiconductor layer constituting the phosphor layer” because whether the semiconductor layer and the phosphor layer are the same element or different element is not clearly defined. For the sake of examination and in light of the specification, it is assumed that the semiconductor layer and the phosphor layer are different elements herein.

Regarding claims 6-9, it is not understood what it is applicant regards as “a semiconductor having a wide band gap” because whether this semiconductor having a wide band gap refers to the semiconductor recited in claim 1 or to a new semiconductor is not clearly defined.

Regarding claim 26, it is not understood what it is applicant regards as “a semiconductor layer constituting the phosphor layer” because whether this semiconductor refers to the semiconductor recited in claim 1 or to a new semiconductor is not clearly defined. For the sake of examination and in light of the specification, it is

assumed that this semiconductor layer refers to the semiconductor recited in claim 1. Further, it is not clear whether the semiconductor layer and the phosphor layer are the same element or different element. For the sake of examination and in light of the specification, it is assumed that the semiconductor layer and the phosphor layer are different elements herein.

Claims 3-4, 10, 12-25 and 27 are also rejected due to their dependency upon the rejected base claim 1 above.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 12-13, 15 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Menda (JP-8-250281, English Translation), of record by applicant.

Regarding claims 1, 12, 13 and 15, Menda discloses in figure 2 an electroluminescent element comprising a pair of electrodes 22, 24 facing each other; and at least a phosphor layer 21 includes a phosphor layer 21a and semiconductor 21b with a wide band gap.

It is noted that Menda teaches in paragraph [0010] the phosphor semiconductor 21b comprises ZnS, which is a wide band gap material in group 12th-16th and greater than 2.5 eV (See page 12, lines 1-8 of the specification of the instant application).

Regarding claim 2, Menda discloses in figure 2 the phosphor layer 21 has a laminated structure of a phosphor layer 21a and a semiconductor layer 21b with wide band gap.

Regarding claim 21, Menda discloses in figure 2 the pair of electrodes 22, 24 are positive and negative electrodes such that holes and electrons can flow in the light emitting layer 21 and emits light.

Claims 1-2, 5-9, 11-14, 21 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Tanabe et al. (U.S. Patent No. 7,083,861).

Regarding claims 1 and 12-14, Tanabe et al. discloses in figure 1 an electroluminescent element comprising a pair of electrodes 2, 7 facing each other; and at least a phosphor layer includes a phosphor layer 4 and semiconductor 4A with a wide band gap.

It is noted that Tanabe et al. teaches in column 3, lines 36-36 the phosphor semiconductor 4A comprises AlN, which is a wide band gap material in group 13th-15th and greater than 2.5 eV (See page 12, lines 1-8 of the specification of the instant application).

Regarding claim 2, Tanabe et al. discloses in figure 1 the phosphor layer has a laminated structure of a phosphor layer 4 and a semiconductor layer 4A with wide band

gap. It is noted that the term "laminated" is hereby interpreted as "being compressed into a thin object". The semiconductor 4A is clearly compressed into the phosphor layer 4 as such there exists a laminated structure of the phosphor layer and the semiconductor layer herein.

Regarding claim 5, Tanabe et al. discloses in figure 1 at least one of the phosphor layers 4 is partially discontinuous layer.

Regarding claim 6, Tanabe et al. discloses in figure 1 the phosphor layer 4 includes a phosphor particle (column 3, lines 35-36) in each of which at least a part of a surface thereof is covered with a semiconductor 4A having a wide band gap.

Regarding claim 7, Tanabe et al. discloses in figure 1 the phosphor layer includes a phosphor particles 4 in each of which substantially all surfaces thereof are covered with a semiconductor 4A having wide band gap.

Regarding claims 8-9, Tanabe et al. discloses in figure 1 the phosphor layer is so configured that the phosphor particles 4 in each of which at least a part of a surface thereof is covered with a semiconductor 4A having wide band gap are dispersed in a matrix material 3.

Regarding claim 11, Tanabe et al. discloses the semiconductor 4A comprises AlN with band gap of 5.7 eV. On pages 11 and 12 of the specification, applicant admitted that a semiconductor of 2 eV or more band gap can be used to cause to emit light of a shorter wavelength than blue light by applying an electric field. Therefore, the semiconductor 4A of Tanabe et al. can cause to emit light of a shorter wavelength than blue light by applying an electric field.

Regarding claims 21 and 25, the pair of electrodes 2, 7 as shown in figure 1 must be positive and negative electrodes such that holes and electrons can flow in light emitting layer 3 to emit light.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. in view of Wakita et al. (U.S. Publication No. 2006/0214563).

Regarding claim 3, Tanabe et al. discloses in figure 1 the light emitting layer 11 interposed between the pair of electrodes 2, 7 comprises the resin 3 formed of any of polyester resin, phenoxy resin, epoxy resin...which is not really transparent conductive. However, Wakita et al. discloses in paragraph [0050] the emissive layer in an electroluminescent device can be formed of polythiophene, which is transparent conductive resin (page 11, lines 1-7 of the specification of the instant application where polythiophene is a transparent conductive resin). In view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al. by including the light emitting layer comprising one transparent conductive layer interposed between the pair of electrodes so as to form an improved electroluminescent device.

Regarding claim 4, the modified electroluminescent device of Tanabe et al. would include the transparent conductive layer 3 (modified layer 3) is a partially discontinuous layer as shown in figure 1.

Regarding claim 10, Tanabe et al. discloses in figure 1 the phosphor particles 4 and the semiconductor 4A are dispersed within a matrix material 3. Tanabe et al. does not disclose the matrix material is a transparent conductor. However, similar to claim 3 above, Wakita et al. discloses in paragraph [0050] the emissive layer in an electroluminescent device can be formed of polythiophene, which is transparent conductive resin. In view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al. by including the matrix material (the light emitting layer) comprising one transparent conductive layer so as to form an improved electroluminescent device.

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. in view of Tsutsui (U.S. Patent No. 7,291,969).

Regarding claims 16-17, Tanabe et al. discloses the semiconductor 4A comprises AlN. Tanabe et al. does not disclose the semiconductor comprises a main component, which is in 2nd-16th or 12th-13th-16th group compound semiconductor. However, Tsutsui discloses in column 8, lines 47-54 an electroluminescent device comprising the semiconductors having wide band gap including AlN, MgS (2nd-16 group), ZnGaSSe (12th-13th-16th group). IN view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al. by substituting

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semiconductor in 2nd-16th or 12th-13th-16th group for AlN to form a semiconductor having wide band gap because these semiconductor materials were art recognized equivalents for having wide band gap.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. in view of Morita (U.S. Patent No. 5,091,758).

Regarding claim 18, Tanabe et al. discloses substantially all the structure set forth in claim 18 except the semiconductor having a main component in 12th-13th-6th group compound semiconductor. However, Morita discloses a light emitting device having a semiconductor with a wide band gap comprises CuAlSe (12th-13th-6th group). In view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al. by including a semiconductor in 12th-13th-6th group so as to form a semiconductor with a wide band gap for use in an electroluminescent device.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. in view of Sato et al. (U.S. Publication No. 2004/0014244).

Regarding claim 19, Tanabe et al. discloses substantially all the structure set forth in claim 19 except the semiconductor in 12th-14th-15th group compound semiconductor. However, Sato et al. discloses in paragraph [0027] a semiconductor with a large band gap comprises ZnSiP (12th-13th-15th group). In view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al.

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by including a semiconductor in 12th-13th-15th group so as to form a semiconductor with a wide band gap for use in an electroluminescent device.

Claims 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. in view of Seo et al. (U.S. Publication No. 2004/0263056).

Regarding claim 20, Tanabe et al. discloses in figure 1 substantially all the structure set forth in claim 20 except an electron transport layer between the phosphor and at least one the electrodes. However, Seo et al. discloses in figure 3A an electroluminescent device having a transport electron layer 1307 between the light emitting layer 1306 and at least one of the electrodes 1302. In view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al. by including a transport electron layer between the phosphor layer and at least one of the electrodes so as to transport electrons from the cathode electrode toward the phosphor layer and thus light can be emitted from the phosphor layer.

Regarding claim 27, Tanabe et al. discloses in figure 1 substantially all the structure set forth in claim 27 except a thin film transistor connected with one of the pair of electrodes. However, Seo et al. discloses in figure 1 a thin film transistor 107 connected with one of the pair of electrodes 121 of the light emitting device. In view of such teaching, it would have been obvious at the time of the present invention to modify Tanabe et al. by including a thin film transistor connected with one of the pair of electrodes so as to provide currents to drive the electroluminescent device.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menda.

Regarding claim 26, Menda discloses in figure 2 the semiconductor 21b is located nearer the electrode side 22 than the phosphor layer 21a. However, Menda does not disclose the electrode 22 is a negative electrode. Nevertheless, the Examiner takes the Official Notice that it is well known in the art to switch the position of the negative electrode and the positive electrode and still does not affect the operation of an electroluminescent device. As such, it would have been obvious at the time of the present invention to modify Menda by switching the position of the negative and positive electrodes such that the semiconductor is located nearer the negative electrode side than the phosphor layer.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fan et al. (U.S. Publication No. 2004/0189188) in view of Tanabe et al.

Regarding claim 28, Fan et al. discloses in figures 1- 3 a display device comprising an electroluminescent array in which electroluminescent element are arranged in two dimensions wherein each electroluminescent element comprises a pair of electrodes 310, 320 facing each other; at least one phosphor layer 330 formed between the pair of electrodes; a thin film transistor connected with one of the pair of electrodes 310 via the drain 220; a plurality of x electrode 420 in parallel with each other extending in a first direction to parallel with a face of the electroluminescent array; and a plurality of y electrodes 410 in parallel with a second direction orthogonal to the first direction in parallel with the face of the electroluminescent array wherein the thin film

transistor 202 is connected with the x electrode 420 and the y electrode 410 respectively. See paragraphs [0026], [0027]. Fan et al. does not disclose the phosphor layer including a phosphor semiconductor with wide band gap. However, Tanabe et al. discloses in figure 1 the phosphor layer includes a phosphor semiconductor 4A with wide band gap so as to prevent the phosphor 4 from moisture and thus improve the light emission efficiency in an electroluminescent device. In view of such teaching, it would have been obvious at the time of the present invention to modify Fan et al. by including the phosphor layer including a phosphor semiconductor with wide band gap so as to prevent the phosphor from moisture and thus improve the light emission efficiency in an electroluminescent device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-1734. The examiner can normally be reached on Monday-Friday, 8:30 am- 5:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300 for regular communications.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Joseph Nguyen/
Primary Examiner, Art Unit 2815
February 29 2008.